Although specialized studies on fruit tree-*T. hemsleyanum* compound systems remain relatively limited, fruit tree-herb intercropping and other orchard agroforestry models can provide important references. In karst rocky desertification control areas, intercropping fruit trees with herbaceous legumes significantly improved economic returns compared with monoculture orchards and enhanced ecosystem services such as groundwater recharge, soil and water conservation, and carbon sequestration. This indicates that a "fruit tree + understory herb" structure can coordinate ecological protection and economic benefits (Cheng et al., 2022). Global studies on horticultural intercropping and fruit tree agroforestry also show that well-designed tree-crop combinations can improve land-use efficiency, yield stability, and the ability to resist climate stress (Burgess et al., 2022; Paut et al., 2024). Therefore, from the perspective of agroforestry management principles, cultivating *T. hemsleyanum* under fruit forests has a sound theoretical basis and promotion potential.

In model design, fruit forests with open crowns, moderate canopy closure, and stable management intensity, such as citrus, bayberry, and loquat orchards, should be prioritized. For shade-loving and climbing medicinal plants such as *T. hemsleyanum*, fruit tree species and planting densities should be reasonably selected so that the understory environment approaches the moderate light and humidity conditions favorable for flavonoid accumulation, such as temperatures of approximately 17.5°C~24.1°C, air humidity of approximately 67%~80%, and shorter sunshine duration (Shi et al., 2022). During planting, areas where fruit tree main roots are concentrated should be avoided, *T. hemsleyanum* planting belts should be reasonably arranged, and supports or mesh frames should be configured to guide vines to climb in an orderly manner, thereby reducing spatial, water, and nutrient competition with fruit trees. Existing studies have shown that, compared with simple creeping cultivation, stereoscopic cultivation can increase tuberous root yield and enhance the contents of key quality markers such as polydatin, piceatannol, resveratrol, and kaempferol in *T. hemsleyanum* (Hu et al., 2023). Therefore, in fruit forest understory cultivation of *T. hemsleyanum*, fertilization, pruning, pest and disease control, and harvesting arrangements for fruit trees and medicinal plants should be coordinated. Organic fertilizers, green control measures, and low-residue management practices should be adopted as much as possible to form a fruit-medicine compound cultivation system that is coordinated and non-interfering.

4.3 *Tetrastigma hemsleyanum*-broad-leaved forest simulated wild cultivation model

The *Tetrastigma hemsleyanum*-broad-leaved forest simulated wild cultivation model is a low-intervention and ecological cultivation model carried out under natural or semi-natural warm-temperate evergreen broad-leaved forests, subtropical broad-leaved forests, or near-natural mixed forests, with the core aim of simulating the natural habitat of *T. hemsleyanum*. The native habitats of *T. hemsleyanum* are mostly humid shrublands, valleys, and mountain slopes at elevations of 300~1 300 m. Broad-leaved forest understories usually have abundant litter, relatively high air humidity, favorable soil humus content, and strong ecosystem stability, which can provide growth conditions relatively close to its wild state. Ecological niche modeling and phylogeographic analyses show that *T. hemsleyanum* is closely associated with warm-temperate evergreen forests, and its highly suitable habitats are controlled by climatic variables such as mean diurnal temperature range and precipitation during the warmest quarter. Under future climate warming scenarios, the highly suitable areas of *T. hemsleyanum* may shrink significantly, highlighting the importance of near-native habitat cultivation in existing suitable forest patches for protecting genetic resources and maintaining ecological functions (Wang et al., 2023).

In the specific construction process, broad-leaved forestlands with stable stand structures, moderate canopy closure, good drainage, deep soil layers, and relatively low human disturbance should be selected. Before planting, large-scale excavation and destructive land preparation should be avoided. Hole preparation, strip preparation, or localized soil improvement can be adopted to reduce disturbance to the forest ecosystem. *T. hemsleyanum* seedlings can be planted at low to moderate densities along forest margins, forest gaps, slopes, valley edges, or understory areas with better light transmission. Existing shrubs and trees can be used as natural supports, or simple supports and ecological mesh frames can be combined for vine guidance. Management should mainly rely on microhabitat selection, low-disturbance land preparation, litter retention, and limited inputs, so as to maintain